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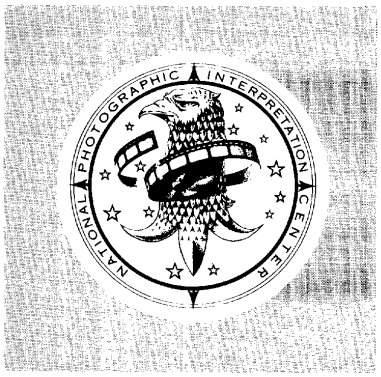

BASIC IMAGERY INTERPRETATION REPORT

NATIONAL PHOTOGRAPHIC
INTERPRETATION CENTER

MELEKESS REACTOR DEVELOPMENT SITE

25X1 [redacted]

ATOMIC ENERGY FACILITIES
USSR

[redacted] 25X1

DECLASS REVIEW by NIMA/DOD

25X1 [redacted]

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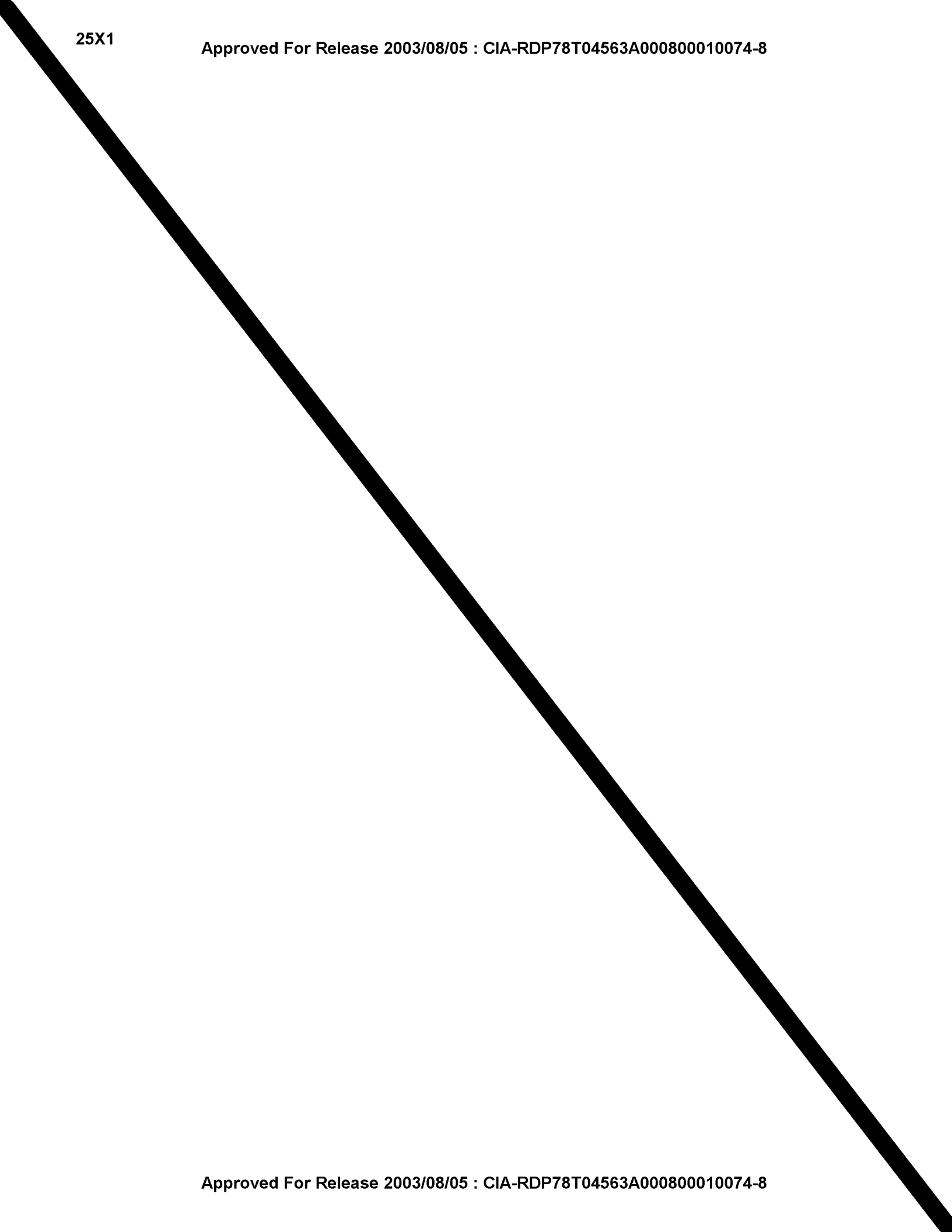

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INSTALLATION OR ACTIVITY NAME	COUNTRY
Melekess Reactor Development Site	UR

UTM COORDINATES	GEOGRAPHIC COORDINATES
NA	54-11-16N 049-28-38E

MAP REFERENCE

25X1 SAC. USATC, Series 200, Sheet 0165-11, scale 1:200,000

LATEST IMAGERY USED	NEGATION DATE (If required)
	NA

ABSTRACT

1. The Melekess Reactor Development Site, USSR, consists of a reactor test area and a main support area. The reactor test area contains five nuclear research reactors, a radiochemical laboratory, and a metallurgical laboratory. The main support area contains a possible fuel element fabrication facility. The site also contains facilities for the treatment and disposal of radioactive wastes.

2. This report updates the NPIC report of the Melekess Reactor Development Site 25X1 published in [redacted] and includes annotated photography, line drawings, and mensural and reference data.

INTRODUCTION

3. The Melekess Reactor Development Site is located approximately 4.8 nautical miles (nm) southwest of the center of Melekess, USSR (Figure 1). It occupies an area of approximately 325 acres. The site, which is heavily wooded, is approximately 40 nm east-southeast of Ulyanovsk and 175 nm south-southwest of Kuybyshev.

4. The site is rail served by a spur from the Ulyanovsk-Melekess rail line, which is part of the Kuybyshev railroad system. A good road network connects the reactor development site to the town of Melekess. The site is situated on a series of low hills southwest of Melekess and is approximately 945 meters (3,100 feet) from the Kuybyshev reservoir. The first interpretable photographic coverage of the site was obtained in [redacted] 25X1

BASIC DESCRIPTION

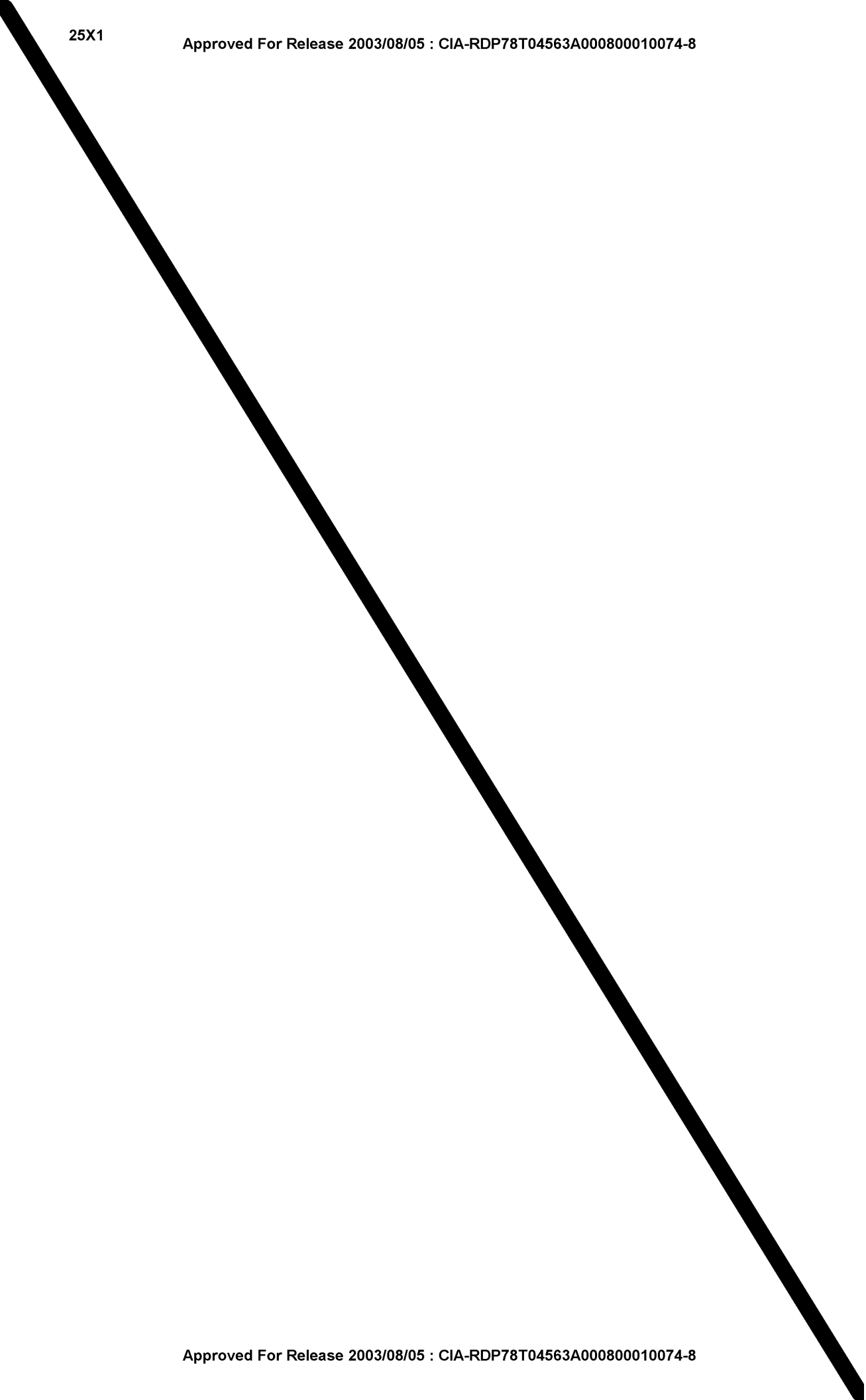
5. The Melekess Reactor Development Site is divided into a reactor test area and a main support area. The reactor test area contains five nuclear reactors, a radiochemical laboratory, a metallurgical laboratory, a suspect critical assembly facility, a possible fluoride volatility plant, and radioactive waste disposal facilities. The main support area contains a vehicle maintenance building, a thermal powerplant, and a possible fuel element fabrication facility.

Reactor Test Area

6. The reactor test area measures approximately 1,220 meters square (4,000 feet square) and is secured by a single fence (Figures 2 and 3). The road and rail service to the area has remained practically unchanged since [redacted] A brief description of the components of the reactor test area in this report updates and supplements information contained in the 1965 report. The radioactive waste disposal facilities are also discussed in detail. 25X1

SM-2 Materials Testing Reactor

7. The SM-2 (item 8, Figure 3 and Table 1) is reported to be a flux-type reactor with an estimated capacity of 50 megawatts thermal. The reactor was under construction in 1959 and the emission of vapor from the larger of two cooling towers (item 24) noted in [redacted] 25X1



25X1 [redacted] indicated it to be operational.[2,3] The SM-2 was the only reactor operating in 25X1 [redacted] A neutron beam tube, identified on photography of [redacted] connects the 25X1 east end of the reactor building to a target building approximately [redacted] 25X1 from the reactor building.

8. New construction since 1965 consists of an underground tank, approximately 18 meters (60 feet) in diameter, south of the reactor building. Five small transformers are newly identified southeast of the reactor building, and three possible transformers at the southwest end. Three support buildings have been constructed southeast of the reactor building, and a covered trench (not shown on Figure 3) carrying a probable pipeline passes the south end of the three buildings.

9. It is reported that the SM-2 is a pressurized, water-cooled reactor which is fueled with enriched uranium. Loop channels are used for experiments, and the testing of neutron beams is one of the functions of the reactor.[4]

MIR Materials Testing Reactor

25X1 10 Analysis of [redacted] imagery indicated that the reactor building (item 27) was 25X1 under construction, and in [redacted] it was approaching the final stages of construction. The three wings adjoining the circular reactor building contain control and laboratory facilities. Five probable transformers are arranged against the east wall of the reactor building, and cables from the transformers probably project through rectangular slots in the wall. A metal stack adjoins the north wall of the reactor building. Photography 25X1 of [redacted] revealed a long cylindrical tank emplaced in an excavation 25X1 approximately [redacted] north of the building; the tank was subsequently earth covered. The MIR reportedly is a pool-type reactor which was operational in 1967. The reactor is fueled with enriched uranium and contains 16 test loops.[4]

VK-50 Boiling Water Reactor

11. The reactor building (item 25) was under construction in [redacted] and 25X1 25X1 completed in [redacted] The reactor is probably located beneath the high-bay section of the building; it is connected by a single loop to a steam turbine. Three transmission lines from the north side of the reactor building connect to an electric power substation (Substation A, Figure 3). The boiling water reactor is designated as Melekess 25X1 Nuclear Powerplant Ulyanovsk [redacted] Soviet open source literature reported that the reactor was a boiling water power generator of approximately 70 megawatts 25X1 capacity and had become operational in [redacted][5]

BOR-60 Fast Experimental Reactor

12. Construction of the reactor building (item 26) was first seen on photography of 25X1 [redacted] when trees were removed from the site. Although the Soviet Union reported that 25X1 the reactor was operational in [redacted] photographic coverage of [redacted] 25X1 indicated that construction of the building was just approaching the final stages.

13. The reactor is located beneath the high-bay portion of the building and the generator hall is at the west end of the building (inset, Figure 3). The low section south of the generator hall will probably contain the canal for the storage of spent fuel. The condensers for the reactor coolant are probably in a building (item 53) northwest of the reactor building. Three cooling towers, each approximately [redacted] in diameter, 25X1 are on top of this building; the cooling towers were first seen on photography of [redacted] 25X1

14. A railroad spur that previously served the reactor building has been removed, as have the security fence and wall that surrounded the building area. In [redacted] a trench 25X1 containing a double pipeline was under construction from the reactor building in a northeast direction. A second trench parallels the pipeline trench on the north side.

25X1 15. [redacted] reported that the BOR-60 is a fast reactor and would attempt to breed its own fuel. The reactor was designed to operate on natural uranium, and if the reactor operated successfully, it would be a model for future nuclear powerplants. Power intensity reportedly started at 60 megawatts thermal, and the coolant was sodium.[8]

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ARBUS Nuclear Powerplant

16. This reactor apparently was developed at Melekess. It is probably housed in a building (item 19) that has an associated metal stack at the north corner; the stack is approximately [redacted] in diameter. Four roof roof vents are located on the building. A transformer is also identified at the southeast end of the building, adjacent to a shedlike structure that apparently contains additional electrical equipment. A horizontal tank at the northwest end of the building may be used to store organic fluids. The reactor is southeast of the smallest of three water cooling towers (item 22), which probably once served as a cooling source for the powerplant's condensers. This cooling tower is now partially dismantled. The building is not rail served.

17. Soviet news sources reported in December 1968 that the ARBUS was an experimental powerplant capable of being dismantled and transported and used an organic fluid as a heat transfer agent.[9]

Radiochemical Laboratory

18. The radiochemical laboratory (item 9) is a T-shaped building used for studying techniques of reprocessing irradiated fuel and separating some of the transuranium elements.[3] The hot cells necessary for this type of operation are probably located in the southeast (stem of the "T") section. The northwest section, which is not as high as the southeast section, probably houses administrative personnel and facilities for the handling of nonradioactive material. By [redacted] the northwest section was complete, and the southeast section was under construction. In [redacted] the southeast section was externally complete. The building is rail served.

Metallurgical Laboratory

19. The metallurgical laboratory (item 7) is an H-shaped building. The northwest section was completed in [redacted] and the southeast section was completed in [redacted] The northwest section, which is three stories high, probably houses administrative personnel and cold cells for metal exploratory work. The southeast section which is one story high has a T-shaped roof monitor; this section probably contains hot cells for the study of irradiated fuel elements. The roof monitor indicates that a probable negative pressure is maintained in the building for the hot cells. A rail spur enters the laboratory building. In [redacted] construction of a building was noted at the southeast corner of the metallurgical laboratory. The excavation for this building is approximately [redacted] A passageway [redacted] will apparently connect the building under construction with the laboratory.

Suspect Critical Assembly Facility

20. In [redacted] two buildings (items 28 and 29) were noted to be under construction at the original site of the abandoned molten salt reactor facility.[3] The length and width of the foundations of the old structures were increased to accommodate the size of the newer buildings. The larger building (item 28), which is now complete, has a T-shaped high-bay structure with eight ventilators in the center of the roof. The roof of the smaller building (item 29) is curved and contains five small ventilators. Neither of the two buildings is apparently connected to the cooling towers or to the fan/filter building (item 10). The extensive use of roof ventilators and an enclosed high-bay suggests that the larger building could house a critical assembly facility, such as a zero power reactor, to be used for research purposes. The smaller building could support the operation.

Possible Fluoride Volatility Pilot Plant

21. A modified T-shaped building (item 48) completed in [redacted] is identified as a possible fluoride volatility pilot plant. Excavation work for the building was first seen on photography of [redacted] A walled and fenced area approximately [redacted] was seen on later photography. The interior construction of the southwest portion of the building appeared to contain the thick walls necessary for the use of

radioactive material and the absence of central columns suggests that an overhead crane may have been installed. The rail line at the north side of the building and a large door at the southwest end suggest that an additional rail spur may be added to service the building. An underground pipeling connects the building to the fan/filter building (item 10), and a second pipeling, that apparently will connect with the radioactive waste evaporation plant (item 31), was under construction.

22. Soviet news sources reported in [redacted] that the largest hot material research laboratory in Europe had been constructed at Melekess for use in studying changes in the physical properties of various metals. The metals are used in fuel rods which, under the effect of radiation, could be studied in specially equipped cells.[10] Cells containing heated columns are used to separate uranium from irradiated fuel by the use of fluorine. This method is known as the fluoride volatility process.[11] 25X1

Support Structures

23. No significant changes have occurred to support structures (items 1-4 and 55 at the east entrance to the reactor test area since [redacted] The cafeteria building (item 55) was completed by [redacted] Since [redacted] seven warehouses have been constructed in a storage area located at the north corner of the reactor area. Some of the buildings remained under construction as of [redacted] 25X1 25X1 25X1 25X1

24. The side panels of the three water cooling towers (items 22, 23, and 24) have been dismantled periodically, probably for removal of algae. The smallest of the three cooling towers (item 22) continues to remain in a dismantled condition as of [redacted] perhaps signifying the discontinuance of operations at the ARBUS powerplant. 25X1

25. Two underground personnel shelters (items 60 and 61) have been identified; one shelter (item 60) is northeast of the MIR reactor, and the other (item 61) is northeast of the radiochemical laboratory. Both have been earth covered, and only vent pipes were discernible.

26. Coincidental with the construction of the BOR-60 reactor building, an electric power substation (Substation A, Figure 3) has undergone several changes. A control/switching building (item 54), with four roof vents and a tall lightning rod, has been constructed at the southwest corner of the substation. Imagery of [redacted] confirms that three transformers remain in place and that a fourth transformer bay is still empty. However, new large circular excavations north of the transformers are probably for the installation of larger-sized circuit breakers. A narrow trench was under construction southwest of the new control building, in the general direction of the BOR-60 reactor building. 25X1 25X1

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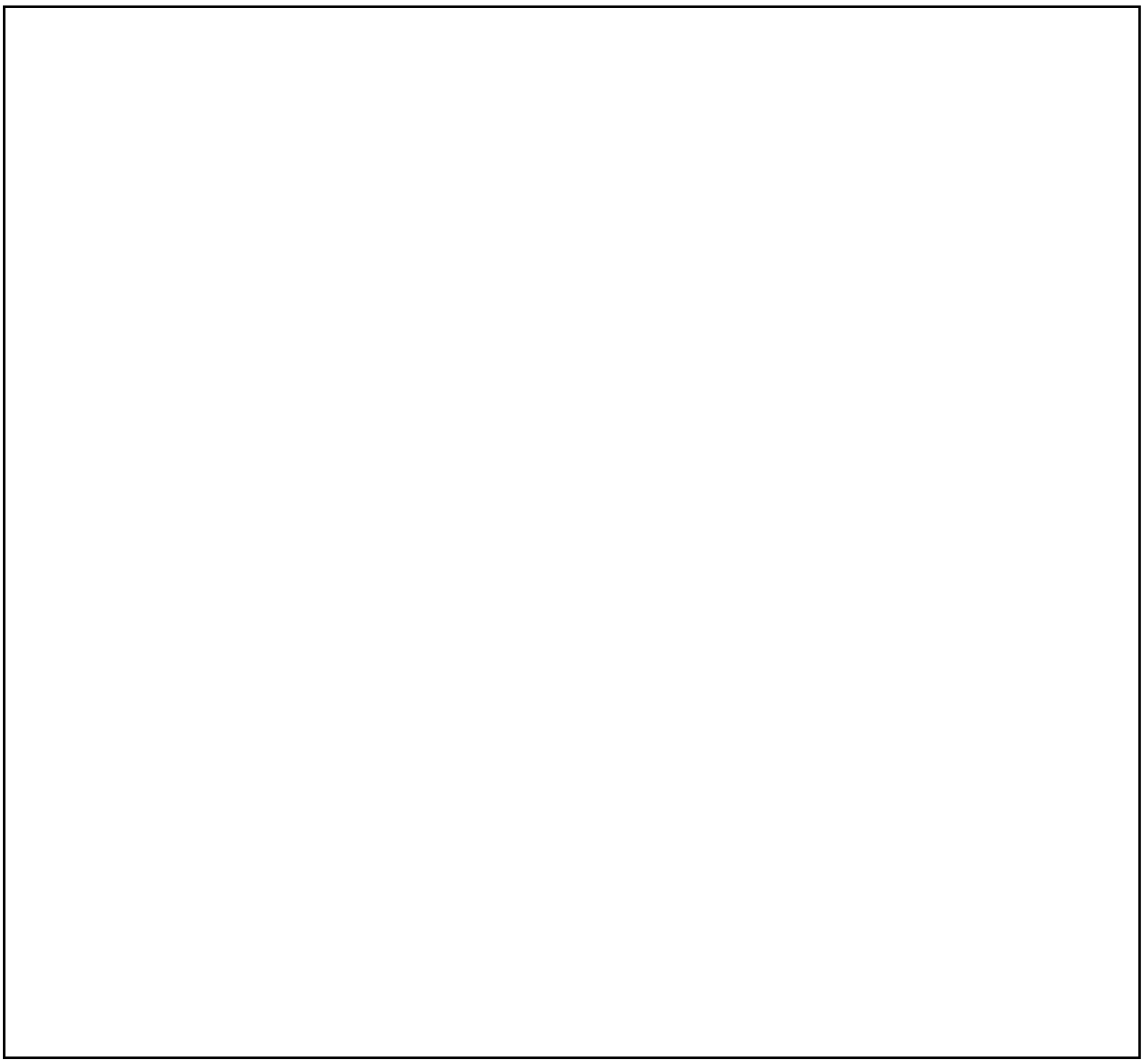

Main Support Area

34. The main support area of the Melekess Reactor Development Site (Figures 4 and 5, Table 2) is located midway between the reactor test area and the town of Melekess (Figure 1). The area, first seen on photography of [redacted] contains a possible fuel element fabrication facility, a motor pool section, a thermal powerplant, a water softener facility, and associated support buildings. The area is served by road and rail from the reactor test area. 25X1

Possible Fuel Element Fabrication Facility

35. A defector scientist reported that while working at Melekess he was associated with the production of uranium dioxide, which he believed was used as reactor fuel.[14] An area possibly containing a fuel element fabrication facility was first seen on photography of 25X1 [redacted] At that time, this walled facility consisted of a fabrication building (item 6, Figure 5 and Table 2), a shipping and receiving building (item 11), and a support building (item 13).[1] The fabrication building was approximately 76 meters (250 feet) long 25X1 [redacted] the fabrication building had been lengthened to approximately 177 meters (590 feet), a warehouse (item 12) and a support building (item 16) had been added, and a workshop (item 8) was in an early stage of construction. Photography of [redacted] 25X1 indicated that the fabrication building had again been lengthened to a total of [redacted] 25X1 25X1 ([redacted] This building appears capable of accommodating overhead cranes and equipment for rolling and milling metal. The building has roof vents and stacks and would contain induction furnaces. It is large enough for acoustic and dynamic testing of fuel rods. 25X1

Thermal Powerplant

36. The thermal powerplant (item 21) was enlarged during the period [redacted] 25X1
25X1 to [redacted] and now apparently contains four boilers. Oil storage capacity was increased and the water treatment buildings (items 19 and 20) were enlarged. On photography of
25X1 [redacted] light-toned discolorations were discernible on the roofs of buildings 19 and 20. Tank filters, degasifiers, and silos located above the southern side of building 19 tend to verify the use of this building for water-softening processes. Sludge is removed by pipeline to a basin (item 26), which was first seen on coverage of [redacted] An ancillary steamplant 25X1 is located at the southeast edge of Melekess (Figure 1).

Other Support Facilities

37. Water is piped to the reactor site and to Melekess from a large water-well system located west of Melekess (Figure 1). The area contains approximately 24 pumphouses and a probable water treatment building.[1] Northwest of Melekess, a housing area is under development; it consists of apartment buildings, high-rise apartment buildings, schools, and a sports field. The housing area probably accommodates personnel from Melekess and from the reactor site. A meteorological tower is newly identified east of the reactor test area and south of the railroad from Melekess (Figure 3).

REFERENCES

[redacted]

MAPS OR CHARTS

SAC. US Air Target Chart, Series 200, Sheet 0165-11, scale 1:200,000

DOCUMENTS

1. NPIC. [redacted] *Scientific Research Institute of Atomic Energy Reactors, Melekess, USSR,* [redacted] Mar 65 (TOP SECRET [redacted]
2. NPIC. NPIC/R-6/62, *Nuclear Reactor Test Site, Melekess, USSR,* Jan 62 (TOP SECRET [redacted]
3. NPIC. NPIC/R-269/63, Scientific Research Institute of Atomic Energy Reactors, Melekess, USSR, Nov 63 (TOP SECRET [redacted]
4. US Department of Commerce. JPRS: 49,510, *French Journalists Visit Soviet Scholars* (translation of an article in *Le Monde,* French newspaper), 24 Dec 69 (UNCLASSIFIED)
5. NPIC. NPIC/R-76/64, *Changes Since 1962 at the Reactor Test Area, Melekess, USSR,* Feb 64 (TOP SECRET [redacted]
6. *Soviet Weekly.* "Experimental Power Station Generates Enough Power for a Town," Apr 66 (UNCLASSIFIED)

[redacted]

8. *Energie Nucleaire.* "Le Reacteur experimental rapide BOR," Vol 12, No 1, Jan-Feb 1970 (UNCLASSIFIED)
9. FBIS. *Daily Report: Soviet Union,* Vol III, No 254, p D7, 31 Dec 68 (UNCLASSIFIED)
10. *Izvestiya,* Moscow, "Melekess Reactor," 29 Dec 67 (UNCLASSIFIED)
11. Hogerton, John F., *The Atomic Energy Deskbook,* New York, Reinhold Publishing Corporation, 1963 (UNCLASSIFIED)
12. US Department of Commerce. JPRS: 48,229, "Handling of Radioactive Wastes at Soviet Atomic Power Stations, USSR" (translation of article in *Atomnaya Energiya*) May 69 (UNCLASSIFIED)
13. *Atomic Energy Review,* Vol 5, No 4, 1967 (UNCLASSIFIED)

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REQUIREMENT

COMIREX 008
NPIC/IEG/SD/NIB Project 221415

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